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[OFFICIAL NOTICE.]

New England Association of Gas Engineers.

OFFICE OF SECRETARY,
BOSTON, January 8, 1884.

The annual meeting of the Association will be held at Young's Hotel, Boston, on the 20th and 21st days of February next, commencing at 11 o'clock A. M., on the 20th of said month.

Members wishing to propose the names of applicants for membership, are requested to send them to the Secretary two days at least before the time of meeting.

The Board of Directors will meet at Young's Hotel, on the evening of February 19. Papers to be read, other than those presented for prizes, must be forwarded to the Secretary in time to be presented to the directors, at this session, for their approval.

Those wishing rooms engaged, will please notify the Secretary on or before February 16.

At the last annual meeting it was "*Resolved*, That the directors of this Association be instructed to offer three prizes, of such amounts as they may see fit, of a value of not less than $100 for the first, for the best papers offered to the Association at its next annual meeting."

The directors have therefore, with the authority thus given them, voted that the following prizes be awarded: For the best paper $100; for the second in merit $50; and for the third in merit $25. The decision as to the merits of the several papers presented, to be made by one or more experts in the gas profession, not active members of the Association. Each paper must be forwarded to the Secretary one week, at least, before the time of the annual meeting, and bear upon it a motto, and be accompanied with a sealed envelope with a similar motto on the outside, and the name of the author inside. The names of the unsuccessful competitors for the prizes will not be made known, and their envelopes will be destroyed, unopened.

In order that our next meeting may be made more interesting and profitable than those of the past, papers bearing upon subjects relating to our profession as gas engineers, whether for prizes or otherwise, are earnestly solicited.

Nothing conduces so largely to make our meetings of real benefit to our members, and give them something of value to carry back to their several fields of labor, as the reading of good papers containing statements of practical results and experiences, accompanied with advice and recommendations by their authors, and the discussions to which they naturally lead.

Managers, superintendents, and engineers of gas companies are cordially invited to the meeting.

GEO. B. NEAL, *Secretary.*

M. S. GREENOUGH, GEO. B. NEAL. } *Committee of Arrangements.*

LEGAL PROTECTION FOR GAS COMPANIES AND GAS CONSUMERS.

The paper of M. Cornuault, presented by the author at the Marseilles meeting of the French Association of Gas Engineers, and afterward published in the *Journal des Usines a Gas*, was considered by us to be of sufficient importance to merit a reproduction in the columns of the JOURNAL. This translation was commenced in the January 2d issue, and the concluding portion will be found in the current number. The style of M. Cornuault's presentation of the subject is at once comprehensive and exhaustive, and we are fain to give it due credit as being the best exposition of the question that has been brought to our notice.

The past and present status of the London gas light companies are things which have never been very thoroughly understood in America (and the fact that a like state of affairs existed in France is asserted by M. Cornuault to be one of the leading reasons for the preparation of his paper), should be a sufficient incentive to ensure a careful perusal and study of the translation, in order that the information thus gained may be of assistance to those engaged in the gas industry in this country in solving some of the problems

that are sure to be shortly brought to their close attention—problems the solution of which will mean the devising of ways and means necessary to the proper care and protection of the gas interests directly under their charge and guidance. Especially should this attention be given by those whose property is in danger of, or likely to be exposed to, the attacks of raiders and blackmailers. Gas makers so situated—and it may be broadly asserted that there is not a locality in the United States where the gas interest possesses absolute immunity from such assaults—ought, from a proper handling and presentation of the facts contained in M. Cornuault's paper, to be able to show conclusively that the true and only way for any gas consuming community to obtain its gas supply at a fair and reasonable price is that those engaged in furnishing the product shall be protected in all their just and equitable rights, while, at the same time, being subjected to, and operating under, proper legal restrictions.

At the 1882 meeting of the American Gas Light Association, the subject of forming some sort of an association or combination for the protection of the gas interests of the country was taken up and discussed. That the spirit of the members was in consonance with the ideas then brought out was clearly proven by the action taken in the appointment of a special committee, which committee was instructed to plan out and report some feasible method of action in the premises. The necessity of united action for purposes of mutual protection had long ere this period appeared quite patent to many; but the appointment of this committee was the first public step toward the devising of measures to secure the needed relief.

In the early part of the succeeding year (1883) the chairman of the committeee appointed to outline the necessary steps (Mr. Wm. H. Price, of Cleveland) died, and, owing to this unforseen and lamentable occurrence, the subject to be considered did not obtain the same degree of attention it would have received had the guiding spirit remained in control. However, the remaining members, after some consultation, made a report at the 1883 meeting of the Association, which, although not entirely covering the ground, still presents some very pertinent suggestions. Quoting from this report, we find it stated, "There is no question in the mind of your committee that an organization of some kind is a necessity, and, sooner or later, it must have an existence." And again, "Your committee think that an organization properly constituted, and imbued with right principles, would advance the interests of the stockholders in every existing company in the land; and that the science and art of the industry would be developed with a celerity and certainty otherwise unattainable. It would surely benefit the public, by compelling the companies to furnish the best known lighting and heating agent at the lowest price consistent with a reasonable return on the capital invested."

To carry out the latter part of the proposition, it must be evident to everyone that the capital invested in gas manufacture should be properly protected and secured to its owners. How this may be best accomplished the committee does not specify; but if some such system of laws were to be enacted in this country as now prevail in England, the result could not be otherwise than beneficial to our gas companies here, in that they would be protected as to their property rights, with the corresponding advantage to the public that gas light would be obtainable, or purchasable, at much lower rates than those now prevailing.

It is a fact, not admitting of controversy, that the cost of gas to the consumer has never, in any instance, been *permanently* reduced through the competition of any opposition company ever established in this country, nevertheless and notwithstanding the outcry inevitably made by the progenitors and promoters of such schemes as to their willingness and desire to make such concessions to the public in the matter of selling prices. Opposition gas schemes are, as a rule, and unfortunately a rule which admits of but few exceptions, instituted with the primary object of raiding, as far as possible, the business of an established company, which business it may have taken years to develop and acquire.

What better or more convincing proof of this is required than by taking a backward glance at the history of the "opposition" company established in Brooklyn, N. Y., during the administration of Mayor Schroeder. During the tenure of office of this so-called "reformer" permission was granted the Mutual Gas Light Company to open the streets and avenues of the city for the purpose of laying mains and conduits for the supply of illuminating gas; in consideration of such grant the projectors of the company agreed that a greater price than $2 per thousand cubic feet should not be charged to consumers. What has been the result? This company, from its very inception, has done all that it could to wreck the older companies; and this wrecking policy was not carried out by selling gas at less cost, but rather by efforts which had for their object the depreciation of stock values, in order that a controlling interest could be secured at figures much below its true value. In reality, instead of selling gas at lower rates, they increased its price.

The pledge made to the authorities at the time when a charter was sought to be obtained, of agreeing not to demand more than $2 per thousand (which was equal to a rate 33 per cent. less than gas was being then sold for in Brooklyn by the existing gas companies), was only given to be broken. To-day they are charging $2.50 per thousand cubic feet in localities where they have succeeded, through their adept system of stock depreciation, in gaining control, or a 25 per cent. higher rate than is charged in locations where possession of the territory is disputed. This example is merely given as a sample; there are numberless others that might just as readily be cited.

The proof that corporate property ought to be protected, and, at the same time properly controlled by our State Legislatures, is ably set forth in the columns of the *North American Review* by ex-Judge T. M. Cooley, Professor of Law in the University of Michigan. We append the following extract:

"The supply of public conveniences to cities is commonly a monopoly; and the protection of the public against excessive charges is to be found, first, in the municipal power of control. Except in very large cities public policy requires that, for supplying light or water, there should be but one corporation, because one can perform the service at less rates than two or more, and, in the long run, will be certain to do so. But scheming men make periodical attacks upon corporations existing for those or similar purposes, and with a popular cry for their watchword, they can always enlist local interest in their favor. If they succeed in obtaining a rival franchise, the subsequent history is commonly this—a war of rates for a season, and then either a sale of one franchise to the owners of the other, or a division of the territory, or an agreement upon charges. The final result is that the two supply the market at a greater cost than the one, and the additional cost is paid by the public.

"Whoever expects that a destructive competition is to be continued indefinitely must have a faith in the integrity and public virtue of local boards which experience scarcely justifies. The legislature which exposes a great property, invested in a public enterprise, to disastrous risks, offers a direct temptation to irregular and crooked proceedings. If men solicit from a city council a franchise which they cannot legitmately make profitable, it is a natural inference that they propose either to use it as a trading property, or in some way to find their profit in the manipulation of future councils.

"The true policy of the State is to give due and full protection to corporate property, and, at the same time, to insist upon the faithful performance of corporate duties. It is no more for its interests to invite and encourage raids on corporations than it is to countenance vast corporate profits for which no adequate return is made. In some kinds of business competition will keep corporations within the limits of reason in their charges; in others it will not. When it will not, it may become necessary to legislate upon profits. If the business is simple, like the supply of light or water, this can be done by prescribing a tariff of rates."

Can any thing be more plain or reasonable than this?

Destruction of Gasholders in England.

During the prevalence of a violent storm of wind, in the early part of last December, serious damage was occasioned to the holders of the Clayton, Allerton and Thornton gas company, situated in the vicinity of Bradford, England. The company owned two gasholders, of different dimensions, the smaller of which had a capacity of about 105,000 cubic feet, and was erected in 1864. The larger vessel was erected some eleven years later, and was estimated to have a cubic content of 225,000 feet, its diameter being 105 feet, and its depth 26 feet. At an early hour of the morning on which the accident occurred a furious burst of wind snapped two of the columns of the large holder, which, becoming dislodged, was forced, by the action of the gale, on to the coping on the south side of the tank. Shortly afterwards the balance of the columns and girders gave way, and the holder itself lay crumpled in the tank. At the time of the collapse the holder contained about 150,000 cubic feet of gas, and this was ignited by contact with the flame of an adjacent lamp, the result being the sudden and rather startling illumination of the surrounding country. The smaller holder, located in close proximity to the other, was injured by the falling iron to such an extent as to loosen some of the plates, and the gas therein contained added its quota to the huge blaze. No one was injured, fortunately, and Mr. J. Niven, manager of the Clayton Company, estimated the damage at about £3,000.

A similar accident occurred, on the same date, and chargeable to the same gale, at the Kildwick Parish gas company's works. At this point a holder (capacity 100,000 cubic feet) was so damaged as to cause the contents—about 75,000 cubic feet—to vanish. This dispersement took place without ignition; beyond the annoyance caused through being obliged to supply gas directly from the station meter, slight pecuniary damage was sustained, it being thought that £150 would fix things all right again. The storm is also credited with having wrecked the roof of the new purifier house at the works of the British Gas Light Company at Hanley.

[Translated from the *Journal des Usines a Gaz.*]

An Account of the London Gas Companies.

By M. Cornuault.

[Continued from page 7.]

The four companies lighting London are, as we said in the commencement, the London Gas Light and Coke Company, the Commercial Gas Company, the South Metropolitan Gas Company, and the London Company. Below we give some details in regard to each of them.

The Gas Light and Coke Company.

The authorized capital of this company, on December 31, 1882, was 11,056,147 pounds sterling, and the paid-in capital amounted to 9,656,147 pounds sterling.

This company is by far the most important, having successively absorbed the following companies:

Great Central, in 1870; City of London, in 1870; Equitable, in 1871; Western, in 1872; Imperial, in 1876; Independent, in 1876.

The Gas Light and Coke Company lights all parts of London north of the Thames, except a portion in the eastern section, which is lighted by the Commercial Gas Company, and two portions in the southwest, lighted by the London Gas Company. It lights about one-half of the area of London, its district also being the richest and most densely populated section. It manufactures about two-thirds of the total amount of gas made (64.2 per cent. in 1882).

The following table, prepared from monthly reports of the companies and the annual recapitulations of Mr. Field, gives the principal results of the work of this company for the past few years:

Year.	Coal Carbonized. Tons.	Cannel. Per Ct.	Gas Manufactured. Cubic Meters.[1]	Gas Sold. Cubic Meters.	Unaccounted for Gas.[2] Per Ct.	Increase of Sales. Per Ct.
1879.....	1,202,774	8.00	345,202,888	322,910,085	5.28	—
1880.....	1,206,217	7.68	353,389,951	330,487,107	5.23	2.29
1881.....	1,262,260	7.86	369,099,541	344,595,413	5.36	4.09
1882.....	1,305,216	4.92	382,854,293	359,156,094	4.98	4.05

1. A cubic meter is equal to 35 cubic feet, 547 cubic inches.

2. Account must here be taken of the gas used at the works and in the company's offices, which, added to the leakage, shows the difference between the gas made and sold.

The importance of this company alone exceeds, by one-quarter, that of the Paris Company, which lights the whole city and a part of the suburbs. The Paris Company, in 1882, manufactured 275,000,000 cubic meters of gas.

The initial price of the gas of this company is, as has been above stated, 3s. 9d. The actual price of common gas is 3s. 2d. per 1,000 cubic feet. The dividend paid the stockholders in 1882 was 11 per cent. The profits, and the price charged, would have permitted the payment of 11¾ per cent.; they preferred to add the difference to the reserve fund.

This company also manufactures, at its works in Pimlico, a rich gas (cannel gas), distributed through special mains, the percentage of cannel coal employed being about 25 per cent. This gas has an illuminating power of 20 candles; its standard, therefore, is 25 per cent. higher than the common gas. This rich gas is actually sold at 3s. 11d.

The maximum price fixed by the Act of Aug. 11, 1876, special for the Gas Light and Coke Company, is 4s. 9d.; but this price must vary in the same ratio as the price of common gas.

The Gas Light and Coke Company owns and operates ten stations, at the following points:

1. Kensal Green.
2. King's Cross.
3. Haggerstown.
4. Bow Common.
5. Bromley.
6. Silvertown.
7. Beckton.
8. Fulham.
9. Pimlico.
10. Hackney.

All these works are not even in the Gas Light and Coke Company's district; Bow Common is on the Commercial Company's territory, and Fulham is on that of the London Company.

Beckton, the greatest of their works (covering more than 140 hectares[1]) actually manufactures 145 millions of cubic meters of gas,[2] and is so arranged as to be able to double that amount when necessary.

1. Hectare = 2 acres, 1 rood, 35 perches.

2. In 1881, 4,895,000,000 cubic feet.

Commercial Company.

This company, of far less importance than the preceding, resulted from the fusion of the Commercial Company with the Ratcliffe Company in 1875. It lights a territory situated on the north of the Thames, and to the east of London; it produces about 8 per cent. of the total manufacture. Its authorized capital, Dec. 31, 1882, was 1,130,000 pounds sterling, and its capital paid in 745,845 pounds sterling.

Below is given the results of the work done by this company for the past few years:

Year.	Coal Carbonized. Tons.	Cannel. Per Ct.	Gas Manufactured. Cubic Meters.	Gas Sold. Cubic Meters.	Unaccounted for Gas. Per Ct.	Increase of Sales. Per Ct.
1879	147,966	7.00	42,697,639	38,954,745	7.69	—
1880	149,587	6.54	44,375,079	40,461,666	7.72	3.72
1881	158,681	6.87	46,162,243	42,341,056	7.18	4.57
1882	162,182	6.43	47,809,725	44,012,011	6.84	3.79

The initial price of gas is 3s. 9d., the same as for the Gas Light and Coke Company. The actual price charged is 2s. 10d. The dividend declared to the stockholders in 1882 was 12½ per cent. The price was reduced to 2s. 10d. during the last six months of 1882. Before that it was sold at 3s.

The Commercial Company has three stations, located at Bromley-Poplar, Stepney, and Ratcliff.

The South Metropolitan Company.

This company, the next in importance to the Gas Light and Coke Company, arose from the fusion of the South Metropolitan with the Surrey Consumers Company (1879) and the Phenix Company (1880). It lights all that portion of London situated on the south of the Thames, except two small sections at the west lighted by the London Company. It covers an area almost equal to that of the Gas Light and Coke Company, but, the population being less dense and poorer, its product is only about 20 per cent. of the total manufacture.

The authorized capital, December 31, 1882, was 3,493,981 pounds sterling; the paid-up capital amounted to 2,092,221 pounds sterling.

Its yield for the past few years has been as follows:

Year.	Coal Carbonized. Tons.	Cannel. Per Ct.	Gas Manufactured. Cubic Meters.	Gas Sold. Cubic Meters.	Unaccounted for Gas. Per Ct.	Increase of Sales. Per Ct.
1879	364,742	3.00	102,724,020	96,817,415	4.74	—
1880	387,263	3.14	107,481,553	100,412,273	5.63	3.58
1881	400,977	2.77	112,000,766	103,481,926	6.38	2.96
1882	418,722	2.06	116,712,095	108,237,910	6.06	4.39

The initial price of gas is, as we have already said, 3s. 6d. The actual selling price is 2s. 10d. The dividend paid to stockholders was 12 per cent. in 1882. This company and the Commercial Company furnishes London its cheapest gas.

The company has five works, located at the following points:

Old Kent Road, Vauxhall, Bankside, Greenwich, and Rotherhithe.

All these works, except the one at Old Kent Road, which is on the Surrey canal, are situated on the banks of the Thames.

The London Company.

This company is the only one, as has been already stated, which, not having been absorbed by another, has remained under the provisions of the act of 1860; for this reason it is not compelled to produce any better than a 12-candle light. Its maximum price for the sale of gas is 4s. 6d. per 1,000 cubic feet; it is entitled to the tolerance, as designated in the act of 1860, for purity with reference to sulphur; on the other hand, it cannot, in any case, declare a greater dividend than 10 per cent.

Notwithstanding these differences, the London Company has always believed it to be to its interest to furnish, for several years past, gas almost up to the standard of the other companies (16 candles), and in the same condition of purity as theirs. As to the price, they charge exactly 3s.

The dividend declared to stockholders is 10 per cent.

This condition of affairs will not last long; the absorption of this company

by the Gas Light and Coke Company, which is certain to take place, and very soon, will cause all the London companies to come under one system and government.

The London Company has four small districts—two to the north, surrounded by the Gas Light and Coke Company, two to the south, surrounded by the South Metropolitan Company (the center and west of London).

This company is the smallest of the London companies; its importance is but little inferior to the Commercial Company. Its output was 7.9 per cent. of the total manufacture. Its authorized capital, December 31, 1882, was 1,052,111 pounds sterling, and its paid-up capital 898,891 pounds sterling.

Its yield for the past few years is as follows:

Year.	Coal Carbonized. Tons.	Cannel. Per Ct.	Gas Manufactured. Cubic Meters.	Gas Sold. Cubic Meters.	Unaccounted for Gas. Per Ct.	Increase of Sales. Per Ct.
1879	154,465	5.00	43,319,317	40,660,784	5.03	—
1880	155,467	5.27	44,181,483	40,911,155	6.21	0.61
1881	161,845	6.24	45,561,208	43,036,157	4.25	4.93
1882	168,289	5.72	47,445,779	44,958,757	4.01	4.31

The company owns but one works, located at Nine Elms. It is one of the most central in London.

If we now consider the four companies together, we will find, for lighting the whole city of London, the following resultants:

Recapitulation.

Year.	Capital Invested. Francs.[1]	Per Cubic Meter Manufactured. Francs.	Coal Carbonized. Tons.	Cannel. Per Cent.	Gas Manufactured. Cubic Meters.	Gas Sold. Cubic Meters.	Unaccounted for Gas. Per Cent.	Increase of Sales. Per Cent.
1879.....	314,542,950	0.588	1,869,947	7.00	534,043,865	499,343,032	5.35	—
1880.....	325,648,850	0.592	1,898,474	6.47	549,398,046	512,272,203	5.59	2.52
1881.....	329,335,425	0.553	1,983,763	6.62	572,823,760	533,454,553	5.62	3.97
1882.....	334,827,600	0.563	2,054,409	4.52	594,821,992	556,364,772	5.27	4.11

1. A franc is about equal to 20 cents.

The relatively small amount of capital invested, when compared with the production of gas, is somewhat remarkable; and, in this respect, a comparison with Paris will be of interest.

The total capital invested in London, at the close of 1882, was 334,827,600 francs, for the manufacture of 594,821,992 cubic meters of gas, or about 0.563 francs per cubic meter (this figure being even decreased, in the case of the Commercial Company, to 0.40 fr. and to 0.45 fr.)

The Paris Company manufactured 275,000,000 cubic meters in 1882, and had a capital of 256,245,000 francs (84,000,000 stock and 172,245,000 bonds), of which 224,729,000 fr. had been paid in, December 31, 1882. This sum represents an investment of 0.81 fr. per cubic meter, or about 50 per cent. above the London figures.

This is explained more particularly because of the relative cheapness in England of apparatus and material used in the manufacture of gas; firebrick products, sheet iron, iron castings, gasometers, machinery, etc.[1]

The amount of gas produced in London is a little more than double that of Paris, and almost equal to the entire manufacture in France, which, according to the official returns in 1879, was 467,491,000 cubic meters, and we suppose ought to be, at this writing, somewhere in the vicinity of 560 to 580 millions cubic meters, for a population of 37,600,000 inhabitants.

The manufacture of gas in England—England and Wales (not including Scotland or Ireland)—rose to 1,800 millions cubic meters for a population of 26,000,000 inhabitants.

From the preceding figures we find that the average consumption of gas per head in England is more than 60 cubic meters; while in France it is only about 15 cubic meters; it is therefore quadruple.

In that which concerns London specially, we have above stated that her population, Dec. 31, 1881, was about 3,831,719 inhabitants, and the total consumption of gas 533,454,553 cubic meters; the consumption per head, then, in 1881 was 139 cubic meters; it must now have reached 145 cubic meters, if the total population has remained the same in 1882—and it certainly is very near that figure.

If we look at the period of 1869 to 1881 we shall see that in 1869, with a population of 3,176,308 inhabitants, the consumption of gas was 279,918,040 cubic meters or 88 cubic meters per head. In 12 years the increase in the consumption of gas has been about 91 per cent., while the increase in population has been only about 20 per cent. The consumption per head has advanced from 88 cubic meters to 139 cubic meters—an increase of 58 per cent. in 12 years, or about 5 per cent. per year on the average.

If we make the same calculation for Paris, taking the ten years 1872–1881 (we do not go back any further, because the years of the war, 1870–1871, would interfere with the comparison), we shall have the following figures:

Year.	Inhabitants.	Consumption.	Per Capita.
1872.....	1,851,972	125,447,688	67.79 cu. meters.
1881.....	2,269,023	225,059,695	99.18 cu. meters.[1]

Thus the actual consumption per head in London is 40 per cent. greater than in Paris. The population of Paris increased 22 per cent. from 1872 to 1881; the total consumption of gas has increased 79 per cent.; the consumption per capita has increased 46 per cent., or, in ten years, about 4.6 per cent. per year.

The increased consumption per capita has, then, been about 4.25 cubic meters, on an average, in London, and about 3.14 cubic meters in Paris, for the period under consideration. Not only is the per capita consumption less in Paris than in London, but it develops itself in different proportions. It is also true of lighting in particular instances, only we must make this distinction, for, while the surface of London is four times that of Paris (30,196 hectares as against 7,200 hectares), public lighting in London represents only the smallest fraction—6 to 7 per cent.—of the total consumption. The number of public lamps in London is about 62,391; in Paris, in 1882, about 46,773.[2] The number of houses, it is true, is very different—489,000 houses in London, 80,000 in Paris.

These figures are at least encouraging for our industry; they prove how far we still are in Paris—and, *a fortiori*, in the provinces, when the consumption in the great cities is only from 50 to 70 cubic meters—from having reached the limit of the consumer's *saturation*, if we may use the expression, and what are the inevitable developments of our ultimate successes, when, through our own efforts, we shall know how to conquer habit and secure the due appreciation of all the advantages arising from the use of gas for domestic purposes.

Thus far we have not spoken of the unlimited charters of the London companies; there is in reality no limit of time assigned the London gas companies in their articles of association, nor is there throughout England. The gas companies hold charters without limit, equivalent, in reality, to a perpetual monopoly. The charters could be revoked for serious reasons, such as continued neglect of the conditions prescribed by the acts which govern them; but which, in reality, are not neglected, and never have been, because the companies loyally fulfilled their obligations.

This makes considerable difference between the English and French companies. The English companies, with their unlimited charters, have not to redeem the capital invested in their enterprises; they are content with paying interest on it. The French companies, on the contrary, have to provide for a redemption depending upon the length of their concession—a liquida-

1. As an illustration we will instance the cost of the great gasometer recently built by the Crystal Palace Company, near London. It was completed for 9.75 francs per cubic meter capacity, while if it had to be erected in France 25 francs per cubic meter would be considered a low price.

1. Similar figures for 1882 would give 105.60 cubic meters, or 103.30 cubic meters, accordingly as you take for the population the number of inhabitants of the census of 1881, or, as we suppose, which is more reasonable, an increase of 50,000 inhabitants—being the average increase during preceding years.

2. The public lamps of Paris, in 1881, burned 34,834,983 cubic meters of gas about 15.5 per cent. of the total consumption.

tion which adds a heavy burden to the net cost when the length of the concession is drawing to a close. This is a point upon which we cannot lay too great a stress.

There is also another important difference; in England the cities pay the same rates as individuals; the companies are not obliged to supply the cities with gas at a greatly reduced price, often less than the net cost of manufacture; for this reason the French companies are often obliged to ask relatively high prices from their customers.

The difference in price imposed upon the French companies, between the price of gas sold to the city and that sold to private consumers, constitutes a heavy charge which falls on the consumers of gas only. All the inhabitants of the same city, whether consumers or non-consumers, have the benefit of the public lighting. This charge is replaced at London by an annual tax on each inhabitant, and amounts, on the average, to about 16 francs per 1,000 francs of rent, and varies each year according to the cost of public lighting.

The English companies are the sole owners of their mains, their equipments, in a word, their entire plant—no portion of it ever, or at any time, becoming the property of the city. The contrary has often taken place in France. Paris, for instance, where at the end of the concession the city becomes the owner of all the mains, and half the plant; at Marseilles the greater part of the mains, and the appurtenances for lighting the public ways, belong to the city at the end of the concession, etc.

In any event the English companies do not divide thei profits, or part of their profits, with the cities. The Paris company paid the city, in 1882, more than 15,000,000 francs for its share of the profits, which increase each year.

Besides these four essential differences there are still others to be noted.

The public lamps of London are maintained by the companies without any loss to them; while at Paris, and elsewhere in France, onerous conditions are imposed by contract with the companies—who are obliged to maintain the lamps, light them and extinguish them under conditions of expense which causes them a serious loss.

Coals do not pay any *octroi* duties on entering English cities; there is one exception, however, at London, a city tax called, "city due," of 1s. 1d. per ton, is exacted; but this is a small affair compared with the heavy duties imposed upon coals in France. At Paris it is 0.02 per cubic meter sold, which amounts to about 5 francs 50c. per ton distilled; at Marseilles it is 4 francs per ton; at Nice, 3 francs per ton, etc.

Finally, to close the series of principal differences, we will add the difference in the price of coal in France and in England, which can be estimated at from 8 to 10 francs in the majority of cases, which lowers the net cost materially in London.

The difference between the capital necessary to manufacture a cubic meter of gas in the two countries, as before stated; the right that the London companies possess, and which the French companies do not, to raise their selling price, when the price of coal does not permit them to give the maximum return on the capital invested, will all go to show the superior relative advantages possessed by the English companies.

The example of London is too often held up to the French companies, but it is useless to insist upon the conditions which lead up to it. As we said in the commencement, the public sees the greater part of the time, in these comparisons, only the prominent fact of the relative cheapness; it understands very well the difference in the net cost caused by the price of coal, but it believes, right or wrong, that this is the only difference; it makes no account of the situation of the London gas companies, holding unlimited concessions, paying 11 to 12 per cent., and more, in dividends to their stockholders, raising the price to the consumer when a 10 per cent dividend cannot be reached;[1] it loses sight of, or ignores, the essential differences in the conditions of existence, differences which sum up, for the French companies, in heavy burdens, and these differences we have sought to make plain.

Sinking a Pit Shaft Through Quicksand.

Mr. Ritson Wilson, of the North Staffordshire (England) Mining Institute read a very interesting paper before that body, at the Stoke-upon-Trent meeting, in which communication the author detailed the operation of sinking a shaft through a quicksand encountered in the Minnie pit at Podmore Hall Colliery. He stated that the boring was first done to a depth of 70 feet, 38 feet of which was quicksand highly charged with water, having only a surface soil of 2 feet. Wrought iron pipes were provided to secure the borehole through the quicksand section, the pipes being made with screw joints. The tubbing was made of cast-iron, in segments, about 7 feet long, 3 feet deep, and 1 inch thick, the bearing width being 5 inches. The finished diameter of the pit was 18 feet. The external part of the tubbing was made with a smooth back suitable for sliding, the flanges all being cast on the inner side. The seams and flanges were all arranged to admit ½-inch pitch pine sheeting, which was put on as each ring of tubbing was put on, and was, therefore, ready for wedging as soon as the tubbing was once bedded. The flange seams were all assisted by internal ribs and bracket stays, to resist the strain the process of wedging put upon them. In each segment there were corresponding bolt-holes for the purpose of bolting the rings of tubbing together while the tubbing was sliding, and when the tubbing was bedded the bolts that strapped the respective rings together were removed and the holes tightly wedged up by pitch pine plugs. This was done in order to dam all the water back, and had proved satisfactory. The tubbing was so arranged that when solid ground was reached with the foot of the tubbing the same might be safely rested and the sinking proceeded with until suitable ground was met with for the wedging bed being laid. The bed being completed the tubbing was brought up from the bed in the usual way, and joined to the tubbing temporarily rested. This enabled a good dry bed to be taken, as all water at the foot of the rested tubbing was gathered with a temporary garland or ring. It was also advisable to so arrange the flanges of the tubbing that masonry could afterwards be built flush by the inner edge of the tubbing, which not only prevented the tubbing from corroding but would prevent anything that might fall down the pit from breaking the flanges off.

The arrangements for hanging the tubbing were as follows: To the 8 screw bolts hanging rods were connected, brought down the face of the tubbing, and coupled to links attached to the eyes or loop-holes cast on the low ring of the tubbing for that purpose. The sinking commenced April last. Before beginning to sink three rings, or 3 yards of tubbing, were bolted together and hung to center line and level by the hanging bolts. They began sinking with nine men to each shift, and as each few inches of pit bottom was dug out the tubbing was lowered in by the screws, and when a depth of 4 feet was reached the water began to come into the pit bottom at the rate of 70 gallons per minute. This, however, did not interfere with the speed of the sinking much till a depth of 9 feet was reached. Then it was found that the ground was beginning to subside for a considerable distance all round the pit mouth, and the sand in the pit bottom began to lift freely 2 feet above the nose of the cutting curve. After working for two hours the lifting in the bottom considerably abated, and they were enabled to make good headway till the sixth yard was reached, when the bottom began to make water at the rate of 140 gallons per minute. The surface all round the pit gradually sunk, but the subsidence was made good by ashes and other loose material. He described the difficulties met with when the tubbing reached the clay section, the tubbing sinking more freely on one side than on the other. The hanging rods were brought into requisition, but were broken. They were, however, caught by ropes attached to them, and prevented from falling upon the men. The tubbing got 8 inches out of plumb. To restore it to a straight position the clay bed on one side had to be undermined. Afterwards the marl on one side of the pit was thicker and stronger than on the other side. The tubbing began to wrench and three rings of it were broken through. This wrenching was checked by driving some legs under the first flange of the tubbing, which made a temporary foundation sufficiently strong. Wrought-iron plates were afterwards screwed across the cracks of the broken segments. Soon after starting again three other rings or segments broke, and the strengthening of these was done in the same manner as the others had been before. The idea of sliding the tubbing any further was abandoned. This necessitated securing the deep side of the pit by spiling, and the sinking was proceeded with at a reduced diameter, or 16 feet 3 inches finished.

To maintain the safety of the foot of the tubbing inside the spiling, a second length of sliding tubbing was arranged and made 16 feet 3 inches in diameter inside. Three lengths of this tubbing were put in which reached the center and level, and the space between the outer and inner rings of tubbing secured with concrete and wedging. Then the sinking went on in the usual way, and as each length of sinking was done a ring of tubbing was bolted on to the lower end of the inset tubbing, which remained a fixture, being secured by legs in the pit bottom, and held by wedging as between the rings. This was repeated for the first 6 yards below the sand. Then a wedging curve-bed was bored for, and by the boring suitable ground was proved to lay about 4 yards down from the foot of the last tubbing ring, or about 10 yards below the foot of the sand. The wedging bed was made of solid cast-iron 18 inches by 5 inches, with two escape-valves, and securely wedged. From this bed the tubbing was brought up in the ordinary way, and jointed to the tubbing hung below the foot of the sand. This tubbing had been wedged, and made the pit altogether down through the sand sections secure. The first 11 yards of the quicksand sinking was accomplished in nine days. After that the men were engaged several days in strengthening the broken segments, and securing the foot of the top length of tubbing. Since the wedging referred to the sinking had altogether gone on very favor-

1. The capital of the Paris company was 256,245,000 francs, Dec. 31, 1882 (84,000,000 stock and 172,245,000 bonds), deducting from the profits for the year's work (42,722,000) the city's share, there remain 27,622,000 francs, or about 10.78 per cent. on the capital invested.

ably, and was now averaging 7 to 8 yards per week finished pit. During the quicksand sinking they had at one time to deal with about 170 gallons of water per minute, which was disposed of chiefly by a pulsometer pump.

A New Residual Product from Coal Gas.

Mr. H. Leicester Greville, F.I.C., etc., read, before the London Section of the Society of Chemical Industry, on Monday, December 3, a paper on "A New Residual Product from Coal Gas," for a report of which we desire to acknowledge our indebtedness to the London *Journal*. A vote of thanks was awarded to the author, upon the closing of the proceedings of the session. The paper is as follows :

It may be as well to state at once, without further prelude, that the new residual product from coal gas about which I wish to make a few remarks this evening is carbon disulphide. It has long been known that this substance is present in crude, and to a limited extent in purified gas ; but I believe that I am correct in terming it "a new residual product," as the samples exhibited this evening are probably the first specimens of carbon disulphide that have ever been shown of the material in bulk prepared from coal gas. I may also state that I have operated on several tons of the raw material from which it is prepared, and have obtained more than 1 cwt. of the liquid product ; so that the preparation has been carried beyond the region of a simple laboratory experiment, and has been transferred to a sufficiently large working scale to come practically within the domain of a commercial operation.

Before proceeding further, it will be necessary for me to briefly explain the system of purification in use at the Commercial Gas works, under the direction of the Chief Engineer, Mr. H. E. Jones. This is absolutely requisite, from the fact that it is only by a method of purification conducted in this special manner that the raw material from which it is possible to obtain the carbon disulphide is produced. It may also be stated, in passing, that a description of the special process used at the Commercial Gas Company's manufacturing station may be all the more interesting from the fact that I believe it to be the best system for combining the maximum of efficiency with the minimum of nuisance. In making this statement, I am speaking advisedly, and from some years of practical experience ; combined with the circumstances of my having made the subject one of special study in my own particular domain as a chemist.

Starting *ab initio*, the crude gas (after reduction to mean atmospheric temperature, by suitable condensing plant) contains, per 100 cubic feet—

Ammonia	190 to 280 grains.
Sulphuretted hydrogen	9.0 " 1,100 "
Carbonic acid	970 " 1,099 "
Sulphur as organic sulphur compounds (principally carbon disulphide)	30 " 48 "

The ammonia is extracted by suitable washers and coke scrubbers, and carries with it a definite amount of associated impurities. The sulphur, as carbon disulphide and organic sulphur compounds, is not affected. The gas then enters a series of large purifiers charged with lime and oxide of iron (hydrated ferric oxide), where the whole of the carbonic acid and sulphuretted hydrogen is extracted, together with a small proportion of the carbon disulphide. The management of these purifiers is conducted with the greatest care ; tests being taken twice daily. In addition, the composition of the crude gas entering the vessels is ascertained every alternate day. These tests are made with the Harcourt tests, which, under intelligent supervision, afford, in a comparatively short time, results sufficiently reliable for practical purposes. According to the results of these tests, the relative quantities of lime and oxide in the vessels are varied ; the object being to so proportion the two materials to the condition of the gas to be purified, that the oxide takes out the whole of the sulphuretted hydrogen, and the lime the whole of the carbonic acid ; the gas at the outlet of the series being free from both these impurities. The result of this system of working is that the lime is taken out almost wholly as carbonate ; the oxide having absorbed the sulphuretted hydrogen. Each kind of impurity is, therefore, eventually removed in the most innocuous form ; and the importance of this, as a question of nuisance, is obvious. Working in a less scientific manner, it is difficult, if not impossible, to ensure a similar result ; for if the proportion of lime is deficient, carbonic acid is not thoroughly eliminated. This is objectionable, not only from this form of impurity acting injuriously on the illuminating power of the gas ; but also from the fact that it materially interferes with the subsequent purification of the gas from the carbon disulphide. If, on the other hand, the proportion of oxide is insufficient, part of the sulphuretted hydrogen, which should have been removed from the purifiers in the innocuous form of iron sulphides, is absorbed by the lime, and is removed as calcium sulphydrate—a compound which, on being exposed to the air, heats, and evolves sulphuretted hydrogen. It is, indeed, due to this action that the main nuisance arising from ordinary gas lime is due ; and the evil becomes the more exaggerated, the greater the proportion of sulphydrate. In the spent material from gas purifiers, where the purification is carried out on less scientific principles, the amount of this compound present is sufficiently great to be the source of considerable nuisance.

We have now arrived at a stage in which the gas is free from sulphuretted hydrogen and carbonic acid, and contains a diminished quantity of sulphur compounds, amounting (as a mean) to about 30 grains. In order to conform to the standard of purity now required, it is necessary that this amount should be considerably reduced. This is effected in a special series of purifiers prepared in a special manner. These vessels are charged entirely with lime, and are subsequently prepared for use by the passage of gas free from carbonic acid, but containing the maximum possible quantity of sulphuretted hydrogen. After impregnation with a certain amount of the latter impurity, the material acquires the property of absorbing carbon disulphide from gas exposed to its action. The explanation of this action most generally received is that calcium sulphide is first formed, thus—

$$Ca\,H_2O_2 + H_2S = CaS + 2\,H_2O$$

and that the calcium sulphide subsequently unites with carbon disulphide to form calcium sulphocarbonate, thus—

$$CaS + CS_2 = CaCS_3$$

The ordinary product of the action of sulphuretted hydrogen diluted with neutral gases upon calcium hydrate is, however, calcium sulphydrate—a compound which does not appear to unite with carbon disulphide ; and if the generally received theory about the action of these sulphide vessels (as they are termed) is correct, it must be assumed that the calcium sulphydrate first formed splits up, as the temperature of the mass rises by the heat of combination, into calcium sulphide and sulphuretted hydrogen. Such a view appears, indeed, to be corroborated by the fact that at very low temperatures an efficient vessel cannot be prepared ; and that the higher the temperature during the action of the sulphuretted hydrogen, the greater the subsequent efficiency of the material. We find, in practice, that each vessel containing about 70 yards of lime when slaked takes up about 6 tons of sulphur as sulphuretted hydrogen before allowing an appreciable quantity of this impurity to pass. A vessel so charged will, on first being used as a sulphur purifier, reduce the sulphur from 30 to 40 grains down to between 7 and 10 grains ; diminishing somewhat in efficiency when the maximum amount of gas is passing—an effect attributable to the increased velocity liminishing the period of contact. When once prepared, these sulphide vessels are, as a rule, used only for clean gas. A little additional quantity of sulphuretted hydrogen going into them occasionally does no harm ; but particular care is exercised to keep the gas entering them scrupulously free from carbonic acid, the admission of which would liberate a corresponding quantity of the carbon disulphide previously absorbed, and thus render the exit gas more impure than that entering the vessel. These vessels (of which we have four at the Stepney station of the Commercial Gas Company) last, when carefully and systematically used, from one to two years ; during which they will more or less purify from about 730,000,000 to about 1,000,000,000 cubic feet of gas. In these figures, I am referring to the four purifiers in the aggregate. Sometimes one is used, sometimes another ; more frequently two or three in sequence, according to the condition of the gas, and the general exigencies of the case. A vessel is taken off when it ceases to do work on the sulphur compounds ; and so long as it does work, even to the amount of a reduction of only some 5 grains of sulphur per 100 cubic feet of gas, the vessel is kept in use.

The lime, on being discharged, is totally distinct in character from ordinary spent lime ; the prevailing color being a bright orange red. The material heats very little on exposure to the air, and no nuisance arises from it ; the only smell being a faint one of carbon disulphide. The dry material oxidizes but slowly ; though in the presence of moisture the oxidation takes place at a quicker rate, the prevailing red color gradually disappearing, and the eventual product being perfectly white. I was much struck with the vivid color of the recently discharged material on the first occasion that I witnessed the discharge of a sulphide vessel at our works ; but I came to the same conclusion that would probably have been formed by other chemists—viz., that the orage red compound was calcium sulphocarbonate. I, however, noticed that in cases where the material heated more than usual in a partially confined space, the odor of carbon disulphide became very perceptible ; and the effect of a gas flame being in the atmosphere was the development of a sufficiently strong odor of sulphurous acid to produce an unpleasantly irritating effect on the organs of respiration. Mr. Jones also informed me that on one occasion when a suphide vessel had, from accidental circumstances, heated in use, the proportion of sulphur in the outlet gas rapidly increased ; proving the partial liberation of bisulphide. Eventually, I tried the effect of exposing a portion of the orange compound to heat ; and was somewhat surprised to find that, by the simple process of distillation with water, liquid carbon disulphide was obtained with the greatest facility, and in a condition of comparative purity. I say that this result somewhat surprised me, as it is generally understood that the alkaline sulphocarbonates, in the pres-

ence of water, form, upon the application of heat, carbonates, with evolution of sulphuretted hydrogen. Thus, in Watts's "Dictionary of Chemisty," Vol. V., p. 493, the following statement occurs :

"The sulphocarbonates of the alkali metals and alkaline earth metals are red, brown, or yellow compounds, soluble in water and in alcohol, and in some cases crystallizable. They are easily converted into carbonates, by heating their aqueous solutions; water being decomposed, and sulphydric acid evolved—*e. g.*,

$$K_2CS_3 + 3\ H_2O = 3\ H_2S + K_2CO_3$$

A similar decomposition takes place thereby in the aqueous solution at ordinary temperature."

The discovery of the facility with which carbon disulphide could be obtained from the spent lime from the the sulphide vessels naturally suggested the practical utilization of the reaction on a larger scale. As a preliminary, selected samples of the material were tested quantitatively in the laboratory by simple distillation with water; the following results being obtained :

Sample No. 1	4.00	per cent.	by weight.
" 2	3.00	"	"
" 3	3.90	"	"
" 4	4.04	"	"

Wishing to test the process on a larger scale, Mr. Jones kindly placed at my disposal a boiler capable of holding several hundred-weight of material; and this I had fitted up with perforated false bottom, pressure-gauge, and the necessary connection for admitting steam and conducting the evolved vapors to a condensing worm. With this apparatus I made a series of careful experiments on the *average* spent material from a recently discharged sulphide vessel, which I could judge, from the amount of the prevailing color, to be a fairly average specimen. The practical result was that the yield of carbon disulphide amounted to from 1 to 2 per cent. of the weight of substance taken. The difference between this practical result and those of the laboratory trials is accounted for by the fact that the last-named tests were made on picked samples, while the larger trials were conducted on average bulk.

I was somewhat disappointed at the practical trials giving so small a yield; more especially considering that the amount of carbon disulphide absorbed by the material when in the purifying vessel was about 4 per cent. by weight. But a little reflection made the question more clear. The purifiers used for carbonic acid and sulphuretted hydrogen are constantly charging the gas with excess of aqueous vapor from the water of hydration of the calcium hydrate during its conversion into carbonate, and that of the ferric oxide during its change to sulphide. A portion of this aqueous vapor condenses in the vessels in which it is formed; and practical evidence is afforded of its presence by the condensation of many gallons daily of liquid draining from the vessels while in action. The gas, however, leaves this series of vessels at a considerably higher temperature than the surrounding air, in consequence of the liberation of heat due to the reaction between the lime and oxide and the carbonic acid and sulphuretted hydrogen. In passing subsequently through the sulphide vessels, the gas becomes more or less cooled; no doubt much of the cooling action occurring in the spaces beneath the lids, over which there is a constant current of air. In this cooling process, water is separated; and, in descending through the mass of lime, carries with it certain proportions of whatever is soluble. A considerable number of gallons, of a bright orange-red color, are, in fact, daily draining from the vessels when in action; and this effect, extending over the whole of the active life of the vessel, must considerably modify the proportions of soluble constituents in the mass of the solid material when it is eventually discharged, and (among other constituents) the proportions of the particular compound containing the carbon disulphide.

Returning, after this digression, to the results of my practical trials, the small yield of carbon disulphide, taken by itself, would seem to place the question at once beyond the region of any practical issue with regard to the general treatment of the material. In the course of the investigation, however, I found that the residue left in the boiler, after the distillation, contained from 50 to 60 per cent. of free lime, and absorbed both carbonic acid and sulphuretted hydrogen freely; so that it would be at least available for re-charging a sulphide vessel, and thus save the expense of fresh material. In connection with the whole question, I also elaborated a scheme for which a patent was at one time contemplated; but on consultation with Mr. Jones, this was abandoned, and I am therefore at liberty to make public the whole of the details. Taking as a starting-point 100 tons of crude material, there would be obtained, on an average, 1½ tons of carbon disulphide, worth (say) £25. In addition to this, the lime remaining in the boiler would, with a slight addition of fresh material, be available for recharging a purifier; and as the lime for this costs about £35, the saving on this score may be put at about £30, making a total of £55. From this would have to be deducted working expenses; but these could not be very great. My scheme, however, did not end here; and I have now to mention what I consider the most valuable portion of it. In the purification of the gas from sulphuretted hydrogen by hydrated ferric oxide, the material after continued use contains about 50 per cent. of free sulphur, and is then sold on a basis of about 7d. per unit per ton; fresh material being purchased in its place. A ton of the spent material fetches, there ore, on a 50 per cent. basis, the sum of £1 9s. 2d. For new oxide of good quality about £1 8s. has to be paid. I proposed in place of selling the spent oxide, to use the crude c rbon disulphide for dissolving the free sulphur; the sulphur being eventually obtained in the solid condition by distilling off the carbon disulphide, and the oxide being left in a condition in which it is again fitted for purifying purposes—being, in fact, more efficient in many cases than the new material, and therefore at the very least as valuable. Supposing, therefore, two tons of spent oxide to be thus treated, the result might be stated as follows :

2 tons of 50 per cent. spent oxide are worth	£2	18	4
They would give—			
1 ton of sulphur at	£5	0	0
1 ton of regenerated oxide at	1	8	0
Total	£6	8	0

In this process, again, I do not think the working expenses would be large enough to interfere with a good margin of profit; and the carbon disulphide is recovered, with a small loss, in better condition than the crude material. Of course the recovered liquid is again available for the treatment of a fresh quantity of spent oxide. I may state that the extraction of the sulphur from spent oxide by carbon disulphide was carried out for some years by the Gas Purification Company, at their works at Stratford.

Finally, I should like to add a few words as to the possible constitution of the red material from which carbon disulphide can be obtained so readily. The spent lime from the purifiers contains the compound as minute ruby-red crystals disseminated through an orange-red matrix. I may state briefly that, from the general behavior of the material, I do not believe that it is calcium sulphocarbonate, but am more inclined to consider it a distinctly new compound. I am making it a subject of investigation; but my results are not as yet sufficiently complete for publication. The investigation is beset with peculiar difficulties, for the raw material, in addition to free lime, contains many compounds soluble in water besides the special one which I desire to isolate. Neither alcohol nor ether affords any means of differentiation. Add to this that the solution decomposes when it is exposed to even a moderate degree of heat, and oxidizes rapidly on contact with air, and the difficulties of the situation will be fully understood. In addition to this, the existing knowledge as to the general behavior of sulphocarbonates, and especially as to any means of systematic analysis, appears to be very limited. The process I have used so far is the distillation of the aqueous solution of the material with excess of led acetate; the distillate being received into excess of alcoholic potash solution with which the carbon disulphide forms potassium xanthate. So far the method I have adopted agrees with that published by Herr Otto Hehner. Hehner then completes the determination of the carbon disulphide by the well-known volumetric process of titration of the solution, previously acidified with acetic acid, with standard copper sulphate, using potassium ferrocyanide as indicator. I have tried this method, and found it convenient and rapid, but scarcely accurate enough for purposes of investigation. I therefore prefer to treat the somewhat dilute solution of xanthate with a solution of potassium permanganate, until a pink color is shown on shaking the mixture, the whole of the sulphur of the xanthate is then in the form of potassium sulphate; an excess of hydrochloric acid is then added, heat is applied, and crystals of oxalic acid dropped in, until the whole of the suspended manganese dioxide has dissolved, and the solution is bright and clear. The analysis is then completed by the addition of a slight excess of barium chloride, and determining the weight of the resultant barium sulphate in the usual way. This method, which takes some time to describe, is not really a lengthy one in execution; and that the results are accurate is shown by the following figures, in which weighed quantities of pure carbon disulphide were taken :

	Weight of Carbon Disulphide taken.		Weight of Barium Sulphate.		Carbon Disulphide calculated.
No. 1	7.65		47.05		7.670
" 2	11.70	divided into two parts	35.68	5.819	11.690
" 3			35.74	5.871	

I may state that the method I adopted for weighing the volatile carbon disulphide without loss was that of counterpoising a small flask containing the requisite quantity of an alcoholic solution of potash. The carbon disulphide was then dropped in from a fine pipette, and the increase in weight determined. The liquid carbon disulphide, on being delivered, falls immediately to the bottom of the potash solution; and, after weighing, a few slight rotary shakes effect a complete solution and conversion into xanthate without loss. The crude carbon disulphide treated by this method, after a single distillation at 120° Fahr., to separate any traces of less volatile constituents, gave—

Carbon Disulphide taken.	Barium Sulphate obtained.	Carbon Disulphide calculated.	Percentage of Pure Carbon Disulphide.
10.73	64.60	10.536	98.19
8.54	51.20	8.350	97.77

The mean percentage of pure carbon disulphide is, therefore, 97.98. The solid residue left on distillation at 120° Fahr. amounted to 0.12 per cent., and consisted of free sulphur and oily hydrocarbons.

While I am satisfied that my process of first producing a xanthate, and subsequently oxidizing it by permanganate, gives a correct result, I am by no means so sure that the original treatment of a sulphocarbonate or similar compound by a metallic solution, followed by distillation, gives the whole of the carbon disulphide present; and to this question I am now directing my attention, with the hope of being shortly in possession of a process which shall, without doubt, admit of the correct estimation of combined carbon disulphide. Gmelin states, when speaking of the reactions of the sulphocarbonate, that although the barium, strontium, and calcium compounds, as well as those of the heavy metals, when heated out of contact with air, yield carbon disulphide and a metallic sulphide, in the presence of water the action of heat gives rise to a variety of compounds such as carbonic acid, sulphurous acid, sulphuretted hydrogen, and sulphur. If this is the case, it is obvious that, in the first treatment of the carbon disulphide compound by heating with a metallic salt, a portion of the carbon disulphide present may suffer decomposition—a result which would impair the accuracy of the determination. I have a means of proving whether this is or is not the case, and shall try it at the earliest opportunity.

In conclusion, I believe that the whole scheme which I have now laid before you for dealing with the lime and oxide, although possibly not commercially profitable in small gas works, would become so where the scale of manufacture was large enough to keep fairly employed the special plant necessary. We should then have one more of the impurities of coal gas transferred from the region of trouble and nuisance to that of profit and utility.

The Domestic Values of Coke and Coal.

We have long been "preaching" in the columns of this JOURNAL as to the advantages of coke over coal as a domestic fuel. These advantages are, to our minds, so palpably plain as to cause matter for wonderment in considering the question "Why does coke not command a more ready sale in the United States?" The fact that our anthracite coal beds furnish a smokeless fuel, when placed in comparison with the coals used for domestic purposes in other countries, is no reason why our citizens should neglect to avail themselves of a substitute at once cleanly and economical. A possible explanation of the existing condition of things in this respect is that the failure may be chargeable to indifference, or, to trace the matter to its real source, to entire forgetfulness on the part of the gas manager. The value of a product such as this is admits of easy demonstration.

The Southwest Virginia Improvement Company, appreciating the value of their product (being largely engaged in the business of coke manufacture) for domestic uses, retained the services of E. J. Howell, M.E., with a view to demonstrating what might be done in that direction. Mr. Howell, in his report to the company, gave the following as the results of five consecutive tests made by him:

Test No. 1.—Morris, Tasker & Co.'s Water Heater.—In 54 hours the coal burned in excess of coke was 30 per cent.

Test No. 2.—Base Burner.—In a 53 hour test of coke and 50 of coal, the excess of coal burned over coke was 15 per cent.

Test No. 3.—Medium Heater.—In 72 hours the amount of coal burned in excess of coke was 15 per cent.

Test No. 4.—Small Heater.—In 48 hours' run with coke and then the same time with coal, the percentage of coal burned in excess of coke was 25 per cent.

Test No. 5.—Kitchen Range.—In a test both for economy and efficiency, it was found that in 48 hours the percentage of coal burned in excess of coke was 13 per cent.

The experimenter states: "As the relative value of anthracite to coke (based on the amount of carbon) may be expressed as 10 to 9, we must look for a reason for the greater economy of coke, as shown by tests. This will be found in the bulk of coke as compared with anthracite. A cubic foot of anthracite will weigh from 53 to 56 pounds, while the same amount of coke will weigh but 27 to 30 pounds. For practical purposes we may call the bulk of coke double that of coal for same weight.

"This greater bulk enables the grates of heaters, stoves, etc., to be covered with a fuel weighing half that of the same amount of coal, and prevents to a great degree the waste from the insane desire of all domestics to fill the heater or range full of coal. Added to this, coke will burn longer and hold a steadier heat than anthracite, when it is used in broad or deep fires and all draughts shut of. Hence, where care is taken on the above points, a remarkable economy, as compared with coal, will result, and the greatest per cent. of saving will be in the largest grates.

"The result in test No. 1 may be considered as above the average to be expected; but certainly the saving in cases referred to of 20 per cent. may be expected.

"In smaller grates a lower per cent. will be made, and the results in tests 2 and 3, which resulted in the same average of saving, may be taken as a fair estimate—that is, 15 per cent.

"From the tests made, the following facts may be stated as demonstrated for the successful burning of coke:

"1st. The size of coke should be a size smaller than that of anthracite for same purpose.

"2d. Fire should be made deep and broad, and after the coke catches, all draughts should be checked (at night entirely, in most cases). Care must always be taken to keep supply of coke large, as fire will not be held except in large bodies of coke.

"3d. The most strongly marked peculiarity of coke is indicated in the above directions—*i. e.*, the absolute need of a body or quantity of it. It cannot be burned in shallow fires.

"4th. The ashes from coke are white powder, and free from clinker."

Mr. Howell concludes—

1st. That coke can be successfully and economically used for all domestic purposes.

2d. That, under proper conditions, and with proper care, coke is more economical than anthracite coal.

Ammoniacal Liquor.

In an article on this subject in a recent number of the *Sanitary Engineer* it is said that the disposal of the residual products in the manufacture of coal gas is a matter which is of constantly increasing interest to the gas engineer. The value of the tar and ammoniacal liquor is such as to render them deserving of a better fate than running to waste in a river or sewer. Engineers recognize this fact, and where there is a market for these products they are readily disposed of. In this country there are many gas companies which realize little or nothing for their residuals, and where the question often becomes how to dispose of them in any way. In cities where the supply is large, outside parties are readily found to purchase the residuals and work them up into more marketable products; but where the quantity is small their disposal is more difficult. Doubtless before many years gas companies will find it to their advantage to work up these products on the spot, or to send them to some central and not far distant point where works could be established, owned possibly by the companies themselves, and so made to yield the greatest possible revenue.

It is reported that a project is on foot for establishing works in the vicinity of Cleveland for the manufacture of the aniline dyes. Whether such a movement is inaugurated this year or next year, it is sure to come sooner or later. At present we import all our aniline and other dyes—a state of things which need not and will not exist when the necessary skill, enterprise, and capital are put into the industry.

There are already a number of establishments where the distillation of tar is carried on, but the products obtained are of a more or less crude nature. The manufacture of dyes is an industry in itself.

The treatment of ammoniacal liquor in order to obtain the commercial sulphate of ammonia is neither complicated nor very expensive. Many companies might have the apparatus necessary for working up this product, while the treatment of the tar would not be advisable.

Dr. Kunoth has given the cost of working up the ammoniacal liquor in the Dantzig gas works. He employed the Gruneberg distilling apparatus, and the results are for the first year's working. The following are the figures as given in the *Journal fur Gasbeleuchtung*, except that, for convenience, marks have been converted into dollars. The cost of the plant was 8,000 marks, or $1,920.

Receipts.

1,150.17 cwt. of salt, at $4.65	$5,356 00

Expenses.

Interest on $1,920, at 5 per cent.	$96 00
Amortization	96 00
1,194.97 cwt. of acid (50° and 60° B.)	1,312 00
220 cwt. of lime	104 00
Coke, breeze, etc	51 00
Wages, packing, repairs, etc	283 00
Total	$1,942 00

This gives a profit of about $3,400. The ammoniacal liquor yielded about 14 pounds of sulphate of ammonia per ton of coal carbonized.

Dr. Knublauch has suggested a simple test for the value of ammoniacal

liquor. He calls attention to the fact that the determination of the specific gravity is a very imperfect test for gas liquor, since the carbonic acid and sulphuretted hydrogen, with which most of the ammonia is combined, vary greatly in their proportions. In one case which he cites the specific gravity test gave a result in ammonia below the true amount by 14½ per cent.

The test proposed consists in diluting 100 c.c. of the gas liquor to 500 c.c. A small flask is then filled about two-thirds full with the diluted liquor, a few pieces of burnt lime added (about 5 gms. per 100 c.c.), corked, and allowed to stand for one hour, with frequent shaking. It is then filtered, and 50 c.c. of the filtrate are tritrated with standard acid, rosalic acid being used to indicate the end of the reaction.

For the addition of the standard acid a specially constructed burette is employed. The first division contains 5.33 c.c. of acid to neutralize the lime in solution, after which the graduations are such as to give percentage of ammonia.

The following are some results obtained by the proposed test, compared with the distillation method:

Percentage of Ammonia.

Distillation Method,	Test Described,
1.795	1.75
1.901	1.97
1.958	1.81
2.006	1.95
2.332	2.37

The Metropolitan Board of Works and the London Gas Companies.

The London *Builder*, in a recent issue, indulges in the following speculations concerning this topic:

The considerations which we laid before our readers as to the proposed amalgamation of the Gas Light and Coke and the South Metropolitan Gas Companies appear to have had full weight with the advisers of the Metropolitan Board of Works. The *Times*, indeed, appears to assume that it is rather with an eye to the future extension of its own powers than for any other reason that this body has now come forward to do its best to prevent the amalgamation. Into that question, thorny as it is, we do not propose to enter, though we may be allowed to say that there is no vice in the management of public business of which the *Builder* has been a more consistent opponent than that of deciding important questions on a side issue. To the expedient of dealing with architectural or engineering questions on political lines, for instance, the greater part of the confusion now existing in much of our legislation is attributable. But we must confess that we see no very evident signs of this sideways action in the observations made by the Metropolitan Board of Works on the scheme of amalgamation. The protection of the South Metropolitan district from the imposition of charges higher than those now imposed on it, to which we referred as essential, has been put in the front of the case raised by the Metropolitan Board. That Acts of Parliament are not to be overridden by Orders in Council is another point made by the Board, as to which the argument is so strong that we have not felt it necessary to bring it forward. We cannot conceive that such an order would be sanctioned that should limit or reduce public rights existing under statutory provisions; nor do we suppose that the order would hold good if it thus infringed on the law. At the same time, it is perhaps well that no mistake should be possible under this head; and that in carrying out any change agreed on by the companies for their mutual advantage, the rights of the consumers should be clearly maintained, and their position shown to be rather improved than deteriorated.

If, however, this safeguard be duly maintained, it is not easy to see that any very great economical advantage is to be derived from the amalgamation. The river Thames forms a practical boundary of gas and water districts, the effect of which must be to make any fusion of a north and south district partake more of the nature of a federation than of unification. At the present time the cost of producing a given quantity of gas is nearly 20 per cent. higher in the Gas Light and Coke Company's district than it is in the South Metropolitan district. The figures in 1882 were: For coals and working expenses (less residuals), per 1,000 cubic feet of gas sold, 21.95d. in the former and 18.37d. in the latter. This difference mainly arises in the cost of coal and the returns from the residuals. As for working expenses alone, the prices come out at 14.70d. and 14.78d. per 1,000, or substantially at the same amount. On the other hand, it may be noted that the cost of management (which is included in the above 14d.) is nearly ½d. per thousand more for the smaller than for the larger company. This is neither unnatural nor objectionable. At the same time, it may be taken to show that the margin for saving by uniting the managements is small, as the total cost, not only of the directors and auditors (which might be reduced), but also of collectors, of salaries, and of general charges, only amounts to 1.05d. per 1,000 cubic feet for the Gas Light and Coke Company, and to 1.45d. per 1,000 for the South Metropolitan Company.

There may, of course, be other elements of advantage in consolidation, of which the directors of the respective companies are probably the persons best able to form an opinion. The usual gain to be derived from absence of competition can hardly come in here; or if it do, it must, we apprehend, be at the cost of the consumer. We can only deal with positive cost. That is, as we have said, considerably less south than it is north of the river. And not only is this so as to coals and working expenses, but interest on capital, in spite of the much larger extent of the district served by the Gas Light and Coke Company, follows the same rule. The net profit per cent. on stock and share capital raised, which in the Gas Light and Coke Company is about 10.04 per cent., rises in the case of the South Metropolitan Company to 12.05 per cent. The total dividends on stock and share capital raised are 10.28 and 11.68 per cent. respectively. One important item of comparison is omitted in the annual returns of the gas companies; nor do we find it supplied either in Mr. Field's "Analysis of the Metropolitan and Suburban Gas Companies' Accounts," or in Mr. Firth's "Municipal London." We refer to the area served by each company. In the case of the water companies we know both the area included in Parliamentary powers and the capital, and we can thus calculate the respective cost of the several services for interest on capital or in any other way that may be desired. In the case of the gas companies this demarcation of area is yet a desideratum, and we can regard only the cost of capital, without being able to see how it has been laid out, as regards area. The total raised capital of the Gas Light and Coke Company is 9,656,147*l.* (for 1882); that of the South Metropolitan is 2,092,221*l.* The only means that we have of estimating how far this capital outlay is proportioned to the actual services rendered by the respective companies is by taking the account of the number of tons of coal carbonized by each. These were, 1,305,216 tons for the Gas Light and Coke Company, and 418,722 tons for the South Metropolitan Company, in 1882. If we compare the above figures we find that the capital of the former company has been laid out at the rate of 7.4*l.* for every ton of coal carbonized in the year, and that of the latter at the rate of 5*l.* for every ton; the southern company thus having made a more economical outlay of capital by 40 per cent., nearly, as regards work done on a given outlay. When this remark is added to those before made as to the comparative cost of coals and working expenses, it will be seen why the South Metropolitan stock should be the more valuable of the two. We can also understand that several reasons may exist for the swallowing up of the smaller company by the larger. But taking, as we have, exact figures, it becomes difficult to see how this absorption should profit the shareholders of the purchasing company, except at the cost of the consumers. And if that be really contemplated, South London will owe a considerable debt of gratitude to the Metropolitan Board of Works for thus coming forward to take the bull by the horns.

That the South Metropolitan Gas Company "presents, and has presented for many years, an excellent standard of comparison, and a stimulus to beneficial rivalry as regards other companies," as stated by the Metropolitan Board of Works, is an outcome of the figures that we have above given. The Board also take the same view as that for which we have given chapter and verse as to the doubts to be entertained of the margin existing for reduction of cost of management. If the proposal for which the sanction of an Order in Council is sought, is intended to have the effect of raising the standard or initial price for the South Metropolitan district by 3d. per 1,000 cubic feet, as understood by the Board of Works, we conclude that such a proposal would, of itself, be enough to wreck the scheme. "Of course," as we wrote on the 3d of November, "the amalgamation can make (or, at all events, should be allowed to make) no difference in this respect." Both companies, as it is, are under the provision of the sliding scale, which has added 1.79d. per 1,000 cubic feet of gas sold to the dividend of the Gas Light and Coke Company, and 2.36d. per 1,000 to that of the South Metropolitan Company. There is thus no feeling of need or pinch of poverty in the matter; and if the companies see that their own interests promise to be materially advanced by the amalgamation, it will be for them to show that those of their customers are as fully protected.

It may be asked what is the lowest cost at which we may look forward to the production of gas for metropolitan use. In the first instance, in the attempt to reply to this question, we have looked through the analyzed expenditure of the existing companies, and taken the lowest price for each item. We must admit that this plan is liable to the objection that some slight differences in management, or in the mode of keeping accounts, may throw an expense that is returned under one head by one company into another column in the accounts of another. With that reserve we give the following figures. The lowest price for coals (or, rather, the highest returns for residual products, leaving the lowest net cost for coal) is in the South Metropolitan Gas Company, and is as low as 3.59d. per 1,000 cubic feet. The least manufacturing charges are those of the Commercial Gas Company of 8.51d. per 1,000. The lowest cost of dis-

tribution is 1.70d. per 1,000 in the South Metropolitan district. Taking for the remaining items of rent and taxes, management, Parliamentary and law charges, bad debts, public officers and testing officers, depreciation of works on leasehold, and other charges, the lowest figures in each case, we have 3.05d. for the lot, making a total of 16.85d. per 1,000 cubic feet of gas sold. The lowest gross profit earned by the London Company, being 11.64d. per 1,000 cubic feet, which, as the standard dividend is 9.83 per cent., we will call 11.86 for a 10 per cent. dividend. The net cost thus arrived at, allowing 10 per cent. dividend, is 28.71d. per 1,000 cubic feet of gas sold; and, making allowances for gross entries, as before said, the division of 10 per cent. to the shareholders seems to be incompatible with a price to the consumer of less than 2s. 6d. per 1,000 cubic feet. With regard to the proportionate outlay of capital, which, in the Gas Light and Coke Company we found to be 7.4*l.* and in the South Metropolitan 5*l.* per ton of coal used in the gross, in the London it is 5.3*l.* for every ton annually carbonized, and over the average of the four urban companies it is 6.5*l.* per ton. If we add a proportionate allowance for the excess of the average capital over that of the London Company above taken, it gives a cost of 32.68d. per 1,000 cubic feet, or a little more than 2½d. per 1,000 above the half-crown before roughly arrived at. This is less than 2d. per 1,000 below the lowest price obtained for gas rental, which is 34.24d. by the South Metropolitan Company. Thus, again, we come to the remark that the actual performance of this company approaches very nearly to what we may regard as the best result likely to be practically attainable in London.

[The writer then goes into a consideration of the practicability of the suggestion made by Dr. Siemens, looking to the manufacture of gas at the coal pits, etc. After going into some calculations upon this subject, the author reaches the conclusion that "when we come to think of the cost of land, works, and machinery for a connection of this kind, we think it will be long before the screw-collier finds its occupation gone." The article concludes with the assertion, "It will be on all accounts to be regretted if any misunderstanding should be allowed to exist as to the amalgamation proposed."]

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

A Short History of the Youngstown (Ohio) Gas Company.—The Youngstown Gas Company was incorporated in the year 1865, Messrs. William Powers, John Stambaugh, Richard Brown, Thomas H. Wells and A. B. Cornell being the originators of the undertaking. The gas plant was erected in the summer and fall of 1865, and gas was first sent out in January, 1867. The company started out with a list of 68 consumers, and at that period Youngstown had but 17 public street lights. The consumer's roll now foots up to the number of 850, with 240 street lights. During the year ending July first, 1868, the company sold 2,750,000 cubic feet of gas, and the price charged was $3 per 1,000 cubic feet. During the year 1882, 22,500,000 cubic feet were sold, at the average price of $1.60 per 1,000. The Youngstown folks have been very successful in introducing the use of gas for cooking and heating purposes—they having set up 275 stoves, of various kinds, to date. Much attention has also been given to gas engines; and, take it all in all, the people of Youngstown have always appreciated the intelligent efforts of Mr. George Cornell, Secretary and Treasurer of the company, ably assisted by Superintendent Moses Coombs, Jr., to give them a full supply of good gas at prices which are satisfactory to all.

Price of Gas Reduced by the Lima (Ohio) Gas Light Company.—The Lima Gas Light Company, on December 1, 1883, made a very large reduction in the selling price of gas. The announcement of the reduction was made in a most effective manner, the company's advertisement occupying the entire front page of the Dec. 4th issue of the Lima *Daily Republican*, and goes to show that the Lima gas officials are thorough believers in the certainty and efficacy of printer's ink. The new rate at Lima is $2.20 per thousand, with a discount of 20 cents per thousand for prompt payment, really making the price but $2. The price previously charged was $3, and gas consumers at Lima are, it is needless to say, more than pleased at the new order of things. We will venture the assertion that the Lima gas management, at the end of 1884, will have no reason to complain of the action lately taken.

How They Seem to Regard it.—The Norwalk (Ohio) *Chronicle*, in speaking of the gas supplied to the consumers of that place (which, by the way, is water gas), says—

"The gas everywhere in this city has been miserably poor and tantalizing for a number of nights of late, proving a source of great vexation and nuisance generally to all its consumers. One of the leading patrons of the company said to us a day or two since, 'I cannot and will not stand it any longer. I shall take out the gas and put in lamps within two weeks.' It is a shame and an imposition upon the public; and our Council ought, in self-protection, and out of regard for the welfare of the citizens generally, to cancel all contracts, and discontinue the use of the gas on the streets and elsewhere; certainly something definite and determined must be done to rid us of this outrage on light." This is pretty plain talk, and is uttered by one who "knows whereof he speaks."

More "Natural Gas" Companies Chartered.—At Harrisburg, Pa., on December 28, a charter was granted to the Kittanning Light and Heat Company, which concern proposes to compete with the Kittanning Caloric Company. It is thought that the Caloric Company will test the validity of the new company's charter by bringing the matter before the courts—the old company maintaining that they have exclusive right to the territory in dispute. Among other applications lodged with the Secretary of State of Pennsylvania, looking to the formation of new natural gas companies, may be mentioned those of the Moon, North Fayette, and Findley companies, all of these being located in Allegheny county. It is a trifle surprising that the large reservoirs of natural gas, which may be tapped almost wherever petroleum oil is found, have not been more extensively employed for heating and cooking purposes than that hitherto recorded. The pressure at the mouths of the wells is very great, and but little difficulty is experienced in conveying the "natural gas," through the commonest sort of mains, to points where it might be made available for all ordinary domestic operations. This problem will, in all likelihood, receive a much greater share of attention and study in the future than has been attracted to it in the past.

Jersey City (N. J.) Gas Matters.—We are informed that the Consumers' Gas Company, a corporation recently organized in Jersey City to enter into competition with the two existing gas companies, the Jersey City and the Peoples, has met with its first legal obstacle. This is about how the matter stands. The Board of Aldermen recently passed an ordinance authorizing the Consumers Company, of which ex-Congressman Orestes Cleveland is President, to construct gas works, lay mains, and do everything necessary to equip them for active operation. Ex-Governor Bedle, as counsel for the existing companies, has applied to Judge Knapp for a writ of *certiorari*, to remove the ordinance into the Supreme Court. It is asserted, on the part of the plaintiff, that the Aldermen have no color of right to pass such an ordinance, because it is really in the nature of a covert contract which will compel the city to take its supply of gas from the new company, for 25 years, at $1.50 per 1,000 cubic feet. Counsel for the Consumers' Company denies that there is any contract expressed or implied in the ordinance, and asserts that the new company intends to conduct its business in an open and legitimate manner. We have received no further details as to whether a decision in the case had been arrived at, but expect to make further record of the matter.

How the New Uniforms Look.—The Trustees of the Philadelphia, Pa., Gas Trust, on the afternoon of January 3, inspected the meter-takers and all out-door employees, who, by the regulations, are required to wear distinctive uniforms. About fifty of the men presented themselves for inspection, and it was the general verdict of the reviewers that the move taken was a decided step in the right direction. The uniforms are neat and "tasty," and were gotten up at a cost of about $15 each. The Trust pays for this equipment. Under the new rules no employee of the Trust has any right to enter a house, to inspect a meter or for any other cause, unless clothed with the official uniform.

Colorado's Coal and Coke Product.—The State of Colorado is rapidly assuming importance as a producer of coal. It is estimated that, during the year just ended, the value of the coal products at this point reached the sum of $2,510,000—a big showing for a young industry. It is also asserted that larger quantities of coke are being made now than ever before, the capacity of the works at Trinidad, El Moro, and Crested Butte having been considerably increased by the erection of new ovens. At El Moro, during 1883, the product of the Colorado Coal and Iron Company amounted to 106,978 tons; at Crested Butte, in the ovens operated by the same company, the product was 17,673 tons; Trinidad county returning her output at 29,175 tons—a total of 153,826 tons. Considerable quantities of Colorado coke, especially of the quality made at Crested Butte, are now shipped to Utah for the use of smelting works.

Approving a Bond.—At the session of the Louisville (Ky.) City Council held Thursday, January 3, one of the matters determined was the approval of the bond submitted by the Citizens Gas Light Company, which company asserts that it is now ready to commence operations. The bond is executed in the sum of $75,000, and Messrs. F. D. Carley and Charles R. Long are the sureties. The bond, among other items, specifies that the company shall make a *bona fide* expenditure of $75,000, within a year from the date it bears, in the prosecution of work on the buildings and mains.

Viewed in the light of recent developments in the case of the mysterious disappearance of the bond given by the old Mutual Gas Company, of Brooklyn, N. Y., which bond was renewed and reaffirmed by the Fulton Munici-

pal Company, when it succeeded to the assets and privileges of the said Mutual Company (mention of which was made in the last issue of the JOURNAL), it would seem to be in order that the Louisville City Clerk, or whatever other official has custody of such papers in Louisville, ought to keep his eyes open for fear the "document" might, at some future time, be numbered among the "absent and missing."

ANOTHER CASE OF "BLOWING IT OUT."—Christine Kerswurm, a young German woman, who has been in the country less than a month, obtained employment in the restaurant of L. Rothenburg, at No. 215 Canal street, N. Y. city. When Mrs. Rothenburg called the girl, on the morning of January 6, she received no response. The door of the apartment was forced open and the unfortunate domestic was found lying in bed in an unconscious state. The room was filled with gas, which was escaping from a burner attached to a small side-bracket. It is said that she will recover.

GOING TO REPLACE THE GAS LAMPS.—The contract between the authorities of Nashville, Tennessee, and the local Brush Electric Light Company, for lighting certain portions of the streets of that city with the arc light, having expired with the year 1883, much to the surprise of many, the electric current was turned off on the night of January 1, owing to the fact that a renewal of the contact could not be effected on terms satisfactory to the electric lighting company. The city paid, during the past year, 50 cents per night for each arc street light. The Board of Public Works and Affairs, the body having charge of such matters in Nashville, were disposed to renew the contract at the old prices, but the electric light people would not listen to this proposal, and made a counter-proposition, in which they requested that the remuneration be placed at $1 per light per night. Naturally enough an advance of 100 per cent. was deemed entirely too great by the board; but they expressed willingness to advance the figure to 65 cents per night, and requested the electric light company, in case it would not agree to that price, to fix upon a reasonable figure to charge for the use of the arc light until such time as the gas lamp posts could be equipped and made ready for use. The electric company, in reply, refused to recede from the dollar demand, and, as stated above, shut off the current on January 1st.

Steps were immediately taken by the city authorities to have the old system of lighting by gas recommenced, and, more than probably, we have heard the last of public electric street lighting at Nashville.

THE "WIZARD" GETS ANOTHER PROPHETIC TURN.—Mr. Thomas A. Edison appears to have been seized with another bad stroke of "prophetic fever," and when Mr. Edison is attacked in this way he is always extremely amusing. That the softening effect of time has not made any perceptible difference on Mr. E.'s imaginative faculties may be readily gleaned from a perusal of an interview lately held between the "prophet" and a *World* reporter. The reporter asked the question, "With the growth of your electric light business has the prediction, as to the corresponding cheapness of the light, been fulfilled?" To this query Mr. Edison replied:

"Well, I should rather say it had. Almost daily we discover some new means of making the cost of the light less. This has been the rule ever since the first plant was obtained. It may be in a dynamo machine, which has been improved so that it does twice the amount of work at one-half the former cost. It may be an improvement in a lamp, which can be so regulated that while it affords just as much or more light the expense is less than before. The fact that we are now and have been for the past six months introducing our light into small towns can leave no doubt in the minds of unprejudiced persons that the electric light is destined eventually to supersede all others. On the 15th of August we formed a company at Sunbury, Pa., for furnishing that place with light. We placed our price at 1¼ cents per hour for each burner; that is equal to $2.50 per 1,000 feet of gas. The gas company put its price down, until now it is furnishing to a few consumers at 96 cents per 1,000 feet. While the number of gas customers had decreased we have received a corresponding increase. Not alone from the gas customers do these come, but out of forty-five who use our light in that place sixteen were formerly consumers of kerosene. In Shamokin the price of gas has been reduced to $1.10 per 1,000 feet."

"What is the average cost of the light to families in the small towns now using it?"

"Well, as I have said before, we charge 1¼ cents per hour for each burner. We divide our customers into three classes. The cost per month of consuming our light to the first or highest class averages between $5 and $7 a month; to the second $4, and to the third from 75 cents to $1. This is, you say, little less than the cost of gas, but the people are so eager now to adopt the light that the price seems to have very little weight with them. The superiority of it over all others is becoming so manifestly clear that we are constantly pushed to the utmost to fill contracts.

"Our plan is a simple one. We take a survey of a town, ascertain the cost of lighting with gas or kerosene, form an estimate as to the least cost of using our light, which may bring a fair remuneration, and then make a proposition to the citizens. A stock company is formed, citizens becoming holders of stock, while our company takes one-quarter of the stock as its compensation. If the company fails, of course we lose the same as the remainder of the stockholders. If it is successful, we of course reap a mutual benefit. Then we erect our buildings, our poles and wires in several places, or, in large cities, place wires underground.

"As soon as we begin operations the gas companies begin to howl. Such has been the case in this city, where, I venture to say, within five years we shall furnish 98 per cent of the light, and in numbers of other places where we have been instrumental in reducing the cost of light. We shall probably within the next two years, furnish light to 200 town and cities in this country. From Texas to Ohio, and from Pennsylvania to Maine, there comes the universal cry for more and cheaper light. The electric light is destined to furnish it.

"Do you think that eventually your light will become as cheap or cheaper than kerosene?"

"That depends upon the people. They now seem perfectly willing to pay the prices demanded. On this account there seems to be no necessity at present for reducing the price to a lower figure than that at which it now stands. I can say this much, that this electric light can be furnished at less cost than any other illumination known to the world."

The *plan* of forming the outside companies is beautiful in its simplicity. The naive and guileless conclusion reached "that if the company fails, of course we lose the same as the remainder of the stockholders," is quite refreshing. The parent company, in New York, makes all the profit on supplying the plant, and what does it lose? Why, 25 per cent. of the profits that *were to be made*, and which no doubt had been previously figured out when the other three-quarters of the stock in the *outside companies* was being subscribed to place the "outside company" on its feet.

That the stockholders in the New York city gas light companies have been "howling" some during the past six months does not admit of question. But the howl possesses none of the characteristics which go to make up or constitute a series of funereal lamentations; nor can it be said that the howl is indicative of the pain experienced by those who are undergoing the severe operation of being "scalped." No, Mr. Edison; you have misinterpreted the tones; dreamers and prophets often fail to decipher these things accurately. The howls that have reached your ears are the howls of joy. Exuberant spirits must find vent; and what is more likely to make investors overflow with gladness than big returns upon the money invested? And big returns have certainly been received by the fortunate holders of shares in New York city gas companies during the past year.

Mr. Edison thinks (it will be noted that he only *ventures* to say this) that "within the next five years" he is going to furnish 98 per cent. of the light now supplied by gas companies in New York. He does not specifically mention gas light, but he hardly includes kerosene, candles, *et al.*, in the calculation. If he ventured to say .98 per centum he would be a great deal nearer the mark. But that figure, or part of a figure, would interfere somewhat with the formation of the "outside companies." Still, gas shareholders in this city ought to be just a little thankful, since Mr. Edison thinks it will take five years to arrive at the 98 per cent. point; time was, you know, when the whole gas interest of the world was to be wiped out by him in a considerably less space of time.

RUNNING TO WASTE FOR TWO YEARS.—About two years ago some searchers after petroleum oil, while operating in Washington county, Pa., encountered a strong reservoir of natural gas at a depth of 2,700 feet. The flow was so strong that drill and everything else pertaining to the oil-drillers' outfit were blown high into the air. It was next to impossible to estimate the volume of the escaping gas. The well was tubed, and the escaping gas ignited. This huge gas light has been burning ever since, night and day, summer and winter. At last the idea has come to the owners of the land to utilize the gas, and a correspondent informs us that a company has been formed, which proposes to conduct the gas to a point called Monongahela, 25 miles distant from the mouth of the well. Experts are reported to have declared that the volume of gas afforded will be ample to supply both Pittsburgh and Monongahela. But we rather doubt this last statement. Still, there is no reason why "natural gas" should not be largely used for fuel purposes in glass works and the like.

A FIRE IN A HUGE PILE OF GAS COAL.—The Superintendent of the Washington (D. C.) Gas Light Company has had his hands full lately in a novel experience. On December 23 the coal sheds of the company were estimated to contain somewhere in the neighborhood of 10,000 tons of West Virginia gas coal. On that date smoke was perceived issuing from about the center of the pile, and an investigation speedily proved that the interior of the mass was on fire. A large force of laborers was at once set at work to remove such portions as could be saved; but about one-half of the material

was destroyed. The coal is said to have contained an unusually large percentage of sulphur, and the cause of the fire has been attributed to spontaneous combustion.

STILL ANOTHER CASE OF "BLOWING IT OUT."—The New York *Daily Tribune*, of Wednesday, January 9th, contains the following: "Lawrence Sullivan, a porter at the Van Dyke House, located in the Bowery, New York city, who has saved fifty persons from death by suffocation in that hotel during the past eight years, at 9 A.M., on the morning of January 8th, detected the odor of escaping gas, which he traced to room number 50. Conrad Kuhn, proprietor of a beer saloon at Tenth avenue and 169th street, had gone to sleep in that room at a late hour of the previous night; when the porter forced an entrance into the room Kuhn was found in a state of insensibility, the gas having been blown out. He was taken to the New York Hospital, where it was said recovery would probably ensue."

If the statement made by porter Sullivan is even approximately true, the name of this house ought to be altered to that of "Hotel Dangerous."

QUALITY OF BALTIMORE (MD.) GAS AND OIL SUPPLY.—Prof. Aiken, official inspector of gas and illuminating oils for Baltimore, Md., on December 31, 1883, reported that the gas supply for the month continued much above the legal standard. One hundred samples of illuminating oils, obtained from different points in the city, were tested; 22 flashed at the standard, 120° F.; 74 above the standard, from 123° to 145°; and four samples flashed below the standard, at from 100° to 105°. In each case the dangerous oil was promptly withdrawn and a safe article substituted.

GIVEN PERMISSION TO STRING THEIR WIRES.—The Common Council of Philadelphia, Pa., has at last granted the Thomson-Houston Electric Light Company permission to string its wires on the poles of the Police and Fire Alarm Telegraph Department, in the vicinity of the Reading Railroad depot, at Broad and Callowhill streets, in that city.

A NEW DEPARTURE IN PETROLEUM OIL TRANSPORTATION.—A new feature in petroleum oil transportation was the chartering of an ocean steamer, on December 26th, to convey a cargo of 10,000 barrels of petroleum from the port of New York to some point in Italy. It is asserted that wooden sailing vessels have hitherto always carried this description of freight, and the above-mentioned charter has excited no little attention amongst the shipping trade. The insurance was one per cent. less than that charged to wooden sailing vessels. The dullness in the export trade in grain is causing the "tramp" steamers—that is, those vessels who have no established or fixed regular stopping places, to seek for cargoes in other branches of the freight-carrying business.

PARTIALLY SUFFOCATED.—Charles Neiman, a waiter at the St. James Hotel, Baltimore, Md., was almost suffocated through the inhalation of illuminating gas at his boarding house, No. 116½ North Howard street, on the night of December 28. On the following morning the odor of escaping gas was noticed, and it was discovered that the escape came from Neiman's room. Neiman was found in an unconscious condition, and Dr. J. A. Gilliss, who was summoned, had to work upon him all day before he pronounced the patient out of danger.

THE YEARLY ALMANAC VISITS.—We have received a copy of the elegant and useful annual pocket diary issued by the American Meter Company. This excellent annual assumes a handsomer shape each year, and whoever compiles it is entitled to great praise. It is a welcome visitor to the members of the fraternity. We are also in receipt of tasteful calendars issued by the Stacey Manufacturing Company, and the Maryland Meter Company.

"STANDARD" WASHERS FOR THE SAN FRANCISCO (CAL.) GAS LIGHT OMPANY.—The Smith & Sayre Manufacturing Company, of New York, recently received an order from Mr. J. B. Crockett, Jr., Engineer of the San Francisco Gas Light Company, for two "Standard" washer-scrubbers, each vessel to have a capacity of 2,000,000 cubic feet per diem. Work has already been begun upon them, and they will be delivered early in the year.

PROPOSING TO INVESTIGATE THEM.—The Albany (N. Y.) despatches, dated December 9, mention the fact that Assemblyman Smith, of New York City, introduced the following resolution in the lower legislative branch:

Resolved, That a special committee be appointed to investigate the gas companies of the city of New York and Brooklyn now manufacturing naphtha or water gas, to ascertain the cost of manufacture, the per cent. of profit, and to determine whether the use of such gas is injurious to public health.

Assemblyman Husted objected to immediate consideration of the resolution; and this objection obliges the matter to take its regular place on the calendar.

THE LOST IS FOUND.—City Clerk Tate, of Brooklyn, New York, reports that the bond filed by the Mutual Gas Light Company, of that city, in 1877, has been found.

The Market for Gas Securities.

Our readers will find stated in our "Item" columns a report of a recent interview between Mr. Edison and a representative of the New York *World*, in which Mr. Edison is recorded as saying that the gas companies are "howling" about something or another—presumably "howling with fear" as to the prospects of the speedy demolition of the gas business, which demolition is to be accomplished through the wonderful agency of the Edison incandescent light. An advance of 20 points in the value of a stock, which is held for investment purposes, and that advance made inside of thirty days, ought to be sufficient and pardonable reason for the indulgence of a little jubilation on the part of the holders thereof. But figures convey their own explanations, and this advance of 20 points was scored in the case of Metropolitan gas, which security was rated in our December 17th issue at 195 bid, 200 asked. At the time of writing (Saturday, January 12) we are obliged to mark it up to 220 bid, with no shares offered at any figure—and we doubt if a bid of 225 would be deemed sufficiently high to occasion a genuine transfer. It may be said that the Edison company is not at present operating a station in the Metropolitan's territory; well, what about that? Is not the *moral* effect of the Edison system supposed to influence the value of all city and suburban gas shares? Let us take the case of the New York Gas Company. Here is a district in which the "wizard" is and has been working for some time back. On December 16, 1881, New York gas was quoted at 104 bid, offered at 106, ex-dividend; on December 16, 1882, we find its value to be 110 to 115; and on January 12, 1883, it is worth 148 to 152—an auction sale of 100 shares being noted on January 8, which were disposed of at 145½. The facts do not bear out the howling theory to a very large extent—*i. e.*, they decidedly alter the nature of the chimes to the tune of which the "howl" is set. Manhattan gas is strong, at 260 bid, no stock offering; Harlem gas is strong and higher, at 117 to 120; Municipal buoyant and aggressive, at 200 to 203; Mutual in the same category, at 128 130—we note a late auction sale of 20 shares of this stock at 128 ex-dividend; Equitable gas is stationary at about 92 to 94.

Brooklyn gas stocks are exhibiting erratic symptoms, although values are fairly well sustained. We quote Brooklyn gas at 130 to 132, which will be noted as an advance; Fulton Municipal is higher, at 115 to 118; Citizens gas is slightly weaker, at 87 to 90 ex-dividend; Metropolitan gas is lower in tone, 84 bid, offered at 87; Nassau steady, at 75 to 80; Williamsburgh steady to strong, at 115 to 118; Peoples weaker, at 70 to 72. At auction, January 8, $3,000 Fulton Municipal first mortgage 6 per cent. bonds brought 108¼—interest from January 1st to be charged to account of purchaser.

In out-of-town shares, Consolidated gas, Baltimore. Md., we quote at 51¾ to 52; bonds same company 109¼ to 109½. Washington (D. C.) gas is higher, and some appreciation is noticed in shares of San Francisco (Cal.) Gas Light Company.

Correspondence

[The JOURNAL is not responsible for the opinions expressed by correspondents.]

In Regard to the Tar Combination.

CHICAGO, ILLS., Jan. 12, 1883.

To the Editor AMERICAN GAS LIGHT JOURNAL:

In an article contained in your issue of January 2d you refer to two meetings of coal tar distillers, giving names of the persons in attendance. Both of these items are correctly stated; but the subsequent portion of the article, relating to the supposed object of the meetings, and which you state is of a hearsay character, is so thoroughly the opposite of the truth as to show that your informant has endeavored to mislead you, and evidently from malicious motives.

At these conferences the relations existing between the gas companies and the tar distillers were not even discussed or mentioned.

The *sole object* of the meetings was to consider the fact that, at the close of the building season of 1883, there was a surplus of about 150,000 barrels of tar on hand. Also, that the prospect was that this surplus would be increased to 300,000 barrels by November 1, 1884.

The entire attention of those present was directed to an endeavor to devise some way to provide an outlet for this vast surplus.

You will readily see that the presence of so large a quantity of tar in excess of the demands of trade constitutes a standing menace to the existing values of all tar products, and will inevitably degrade these values very largely unless new channels for its disposal are discovered or created.

It is, therefore, manifest that the proceedings at the conferences of the tar distillers, instead of being inimical to the interests of the gas companies, were identical with those interests.

The article in your paper is calculated to create a contrary impression, owing to the invented version of your informant, and we ask you to give space to this letter so that the real facts may be known. Respectfully,

BARRETT & KIMBALL.